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The American Economic Review

VOL. XI

SEPTEMBER, 1921

No. 3

THE MOVEMENT OF REAL WAGES, 1890-1918

No economic question has been more widely discussed of late than that of the effect of the great war upon real wages. Were they higher at its conclusion than at its beginning? What was their progress during its course? How do all these rates compare with earlier wage levels? This study aims to throw light upon the problem by continuing, for the years 1912-1918, an investigation made by Dr. I. M. Rubinow for the period 1890-1912.¹ Since what we are interested in is real wages, we are, of course, equally concerned with the relationship between money wages and prices.

It will be remembered that Dr. Rubinow's computations showed a decline in the purchasing power of hourly wages in terms of food, from the 1890-1899 average to the 1912 average of 8.2 per cent and of the purchasing power of full-time earnings of 14.7 per cent. Although Dr. Rubinow's method was criticized in some respects, an investigation by Mr. F. W. Jones² showed substantially similar results. In the main, then, Dr. Rubinow's investigation may be said to have stood the test of criticism and to be sound within its self-constituted limits. If this study can be carried on to 1918, we shall have a fairly accurate picture of the movement of real wages for a period of nearly thirty years (1890-1918). Such a period is long enough to show the general trends in money wages, prices, and real wages.

Any study of real wages must, of course, deal with the relation between (1) money wages and (2) the cost of living. Dr. Rubinow's wage material was based upon the wage rates from 1890 to 1912 for fifteen different industries as published by the United States Bureau of Labor

¹ I. M. Rubinow, "The Recent Trend of Real Wages," *AMERICAN ECONOMIC REVIEW*, vol. IV (Dec., 1914), pp. 798-817.

² F. W. Jones, "Real Wages in Recent Years," *AMERICAN ECONOMIC REVIEW*, vol. VII (June, 1917), pp. 318-330. By projecting a series of 30 food commodities from 1907 to 1912, Mr. Jones arrived at the conclusion that the index of these 30 food commodities instead of the 15 that Dr. Rubinow used would have shown approximately a 3 point less decrease than that evidenced by Dr. Rubinow's statistics. Professor H. P. Fairchild tends to corroborate Rubinow's study when he infers that the standard of living of the average American workingman decreased from 1890 to 1908. See his "The Standard of Living—Up or Down," *AM. ECON. REV.*, vol. VI (Mar., 1916), pp. 9-25. The four years from 1908 to 1912 which were not included in Fairchild's study were the very years, according to both Rubinow and Jones, in which the greatest amount of the fall in real wages occurred.

Statistics.³ These industries were: woolen goods, cotton goods, boots and shoes, millwork, furniture, lumber, silk goods, bakers, foundry and machine shops, marble and stone cutters, building trades, car building, knitted goods, book and job printing, and newspaper printing. By using the simple average of these fifteen industries, index numbers for the relative hourly and "full-time" weekly wages were derived for each year with the average for the period 1890 to 1899 serving as the base or 100.

The price material was based upon the average annual retail prices of fifteen food commodities for which permanent records existed from 1890 to 1912. These commodities were granulated sugar, wheat flour, creamery butter, fresh milk, rib roast, pure lard, cornmeal, strictly fresh eggs, hens, round steak, sirloin steak, smoked ham, pork chops, smoked bacon, and Irish potatoes. The annual figures were expressed as index numbers with the average for the period 1890-1899 as the base or 100. The use of retail food prices alone as a measurement of the cost of living has been criticized by some authorities. However, since food forms approximately 40 per cent of the workingman's expenditures, it is the best single index that we have. Moreover, as we shall see from later investigations, in complete studies of the cost of living, the increase in food prices over a period of years has been found to approximate closely the increase in the cost of living. It seems fair, therefore, to conclude that Dr. Rubinow's computation was an approximately accurate reflection of general living costs.⁴

By what methods then has this study of Dr. Rubinow's been carried on for the six-year period 1912-1918?

1. *Money Wages*

Data as to wages and hours during this period have been published for only ten of the fifteen industries represented in Dr. Rubinow's investigation. These industries and the bulletins of the United States Bureau of Labor Statistics in which the material is published are as follows:

Bulletin 259, *Baking trades, building trades, foundry and machine work, marble and stone cutters, millwork, book and job printing, newspaper printing.*

Bulletin 260, *Boot and shoe industry.*

Bulletin 261, *Woolen goods.*

Bulletin 262, *Cotton goods.*

The wage scales quoted for the first seven industries were the accepted

³ In bulletins 128, 129, 134, 135, 137, and 131.

⁴ With the exception, of course, of the slight changes that might be introduced by using Dr. Jones's method.

union rates, while those for the cotton, woolen, and boot and shoe industries were taken from actual pay-rolls.

The question may well be asked whether the reduction in the number of industries from fifteen to ten does not invalidate the comparison. To test this objection a comparison was made for the period 1890-1912 of the ten industries as compared with the fifteen taking up (1) number of hours per week, (2) average hourly wage-rates, (3) average full-time weekly earnings, (4) purchasing power of wages per hour in terms of food, and (5) purchasing power of full-time weekly earnings in terms of food. The same methods of computation employed by Rubi-now were used for the index numbers of the ten industries. While the detailed results for the ten industries will be given later, the following table shows that the differences between the two for the period in question were not appreciable.

TABLE I.—DEVIATION OF TEN INDUSTRIES FROM FIFTEEN INDUSTRIES FOR PERIOD 1890-1912.

(+ indicates when 10 industries exceed 15. — indicates when they fall below)

Year	Hours per week	Wages per hour	"Full-time" weekly earnings	Purchasing power	
				Wages per hour	Weekly earnings
1890	— .2	— .8	—1.0	— .8	—1.0
1891	— .1	— .6	— .7	— .6	— .7
1892	+ .1	— .2	+ .1	— .2	— .1
1893	— .1	—1.1	— .2	— .1	— .1
1894	+ .7	— .9	— .2	— .9	— .2
1895	+ .3	— .4	— .9	— .4	—1.0
1896	.0	+ .2	+ .2	+ .3	— .1
1897	.0	+ .6	+ .6	+ .6	+ .7
1898	— .3	+ .7	+ .4	+ .7	+ .4
1899	+ .5	+1.0	+ .5	+1.0	+ .5
1900	— .7	+2.1	+1.4	+2.1	+1.4
1901	— .6	+1.7	+ .9	+1.5	+ .8
1902	— .8	+ .9	— .1	+ .8	+ .8
1903	—1.0	+1.7	+1.1	+1.5	+ .3
1904	— .6	+1.9	+1.0	+1.7	+ .9
1905	— .6	+ .4	— .4	+ .3	— .3
1906	— .6	+1.5	+ .7	+1.2	+ .6
1907	— .8	+1.9	+ .7	+1.5	+ .5
1908	— .9	+3.1	+1.7	+2.4	+1.6
1909	—1.0	+3.5	+1.8	+2.5	+1.3
1910	—1.3	+3.0	+ .8	+2.1	+ .6
1911	—1.1	+3.5	+1.7	+2.5	+1.2
1912	—1.9	+4.4	+1.0	+2.8	+ .6

It will be noticed that the differences in wages per hour were less than one point for half of the years with a maximum deviation of 4.4 and an average deviation of approximately 3.4 for the six years from 1907 to 1912. The deviation for "full-time" weekly earnings was less than 1.0 for over half of the years and never exceeded 1.8, averaging 1.1 for the years 1907-1912. The deviation for the purchasing power of hourly wages was less than 1.0 in ten of the years, in no year exceeded 2.8 and for the last six years averaged approximately 2.3. Finally the deviation for the purchasing power of full-time weekly earnings was less than 1.0 for two thirds of the years, never exceeded 1.6, and averaged .9 for the last six years.

It will thus be seen that the results are substantially the same whether one uses ten industries or fifteen. Moreover, from 1903 to 1913, when real wages were dropping most rapidly, the ten industries show a less decrease than the fifteen. It seems safe to assume therefore that the use of the ten industries will give as accurate results as the fifteen used by Dr. Rubinow. Indeed any defects that exist will probably be in overestimating the rise in money wages and in underestimating the fall in real wages. In other words, any errors will be on the bright rather than the dark side of the picture.

The method of carrying on the study was as follows: First, an index number for each industry as a whole was derived from the simple averages of the index numbers of *all the occupations within* the industry as given by the bulletins of the Bureau of Labor Statistics. Simple rather than weighted averages were used because the *Nineteenth Annual Report of the Bureau of Labor on Wages and Hours of Labor* clearly demonstrated that simple averages gave almost exactly the same results as weighted averages.⁵ Second, when index numbers were found for each industry for the years 1912-1918 for (1) hours per week, (2) wages per hours, and (3) full-time weekly earnings, the figures were converted from the 1913 base used in the Bureau of Labor Statistics studies to the 1890-1899 base used by Rubinow. The year 1912 acted as the point at which the new index was spliced to Rubinow's index. Third, the index number for ten industries as a whole was obtained. Here again, as in Rubinow's investigation, the simple rather than the weighted average was used.

Table II shows the change in relative number of hours agreed upon as a week's work for the period 1890-1918. This table shows: (1) an

⁵ *Nineteenth Annual Report United States Bureau of Labor: Wages and Hours of Labor*, p. 22. Four methods of averaging were used yet the greatest deviation between any two of them for the fourteen years from 1890 to 1903 was 1.7 points and, save for that one year, it never exceeded .8 and for ten of the fourteen years ranged between .1 and .5.

TABLE II.—RELATIVE "FULL-TIME HOURS" PER WEEK (BASIS 1890-1899).

Year	Woolen goods	Cotton goods	Boots and shoes	Millwork	Building trades	Bakers	Marble and stone cutters	Foundry and machine shops	Printing, book and job	Printing, newspaper	Averages
1890	101.0	100.5	100.3	101.3	102.5	100.8	101.5	100.5	101.0	100.2	100.9
1891	101.0	101.2	100.6	100.6	101.8	100.8	100.1	100.4	101.0	100.1	100.8
1892	101.0	101.6	102.0	100.7	100.7	100.9	100.2	100.2	100.5	100.6	100.8
1893	99.5	100.0	100.0	100.1	100.5	100.5	101.0	100.0	100.4	101.3	100.3
1894	99.0	97.5	100.0	100.3	100.7	100.4	100.5	99.9	100.1	100.5	99.9
1895	100.1	99.8	100.0	99.7	100.3	99.9	100.1	100.1	100.2	100.4	100.1
1896	100.1	99.5	100.0	99.0	99.2	99.6	99.9	99.8	100.1	100.2	99.7
1897	98.4	99.1	99.8	99.6	98.6	100.2	99.4	99.7	100.2	100.0	99.5
1898	98.9	100.3	99.7	99.4	98.1	99.1	99.2	99.9	99.4	99.1	99.3
1899	100.0	100.3	99.6	99.2	97.5	97.8	98.1	99.4	97.2	97.9	98.7
1900	99.8	100.1	99.3	98.9	95.5	96.9	97.2	99.2	95.1	97.6	97.9
1901	99.9	99.9	99.6	98.7	94.4	96.3	96.0	98.1	94.4	97.4	97.5
1902	99.8	99.5	98.4	97.7	92.6	95.8	95.5	96.6	93.2	97.1	96.6
1903	98.7	99.3	97.0	97.2	91.8	93.9	94.0	95.4	93.1	96.2	95.7
1904	97.9	99.2	97.1	97.9	91.3	93.6	94.0	94.6	92.4	95.7	95.4
1905	98.5	99.2	96.8	98.1	91.2	92.5	94.2	94.8	92.0	96.2	95.4
1906	98.4	98.7	96.3	96.9	90.9	91.8	93.6	94.8	90.7	95.4	94.8
1907	97.9	97.5	96.0	96.7	90.6	91.6	93.4	94.6	90.1	94.3	94.8
1908	97.7	96.3	95.9	96.7	90.4	89.7	93.3	94.5	87.4	94.5	93.6
1909	97.8	96.4	95.7	96.7	90.2	88.6	93.2	93.8	86.8	94.4	93.4
1910	96.1	94.1	95.1	96.9	89.7	86.8	93.0	93.4	86.0	94.0	92.5
1911	96.2	94.1	95.3	96.8	89.4	85.1	92.9	92.8	85.5	93.9	92.2
1912	94.6	92.4	93.9	96.2	89.2	81.2	91.8	92.8	85.5	93.8	91.1
1913	92.2	94.2	93.1	96.2	85.9	82.0	91.3	92.2	85.5	93.8	90.6
1914	91.1	92.6	92.4	94.3	83.8	82.0	91.3	92.0	85.5	93.8	90.1
1915	1	1	1	94.3	85.6	82.0	91.3	92.0	85.5	93.7	89.7
1916	90.6	92.6	92.1	94.3	85.1	81.2	91.3	91.6	85.6	93.7	89.7
1917	1	1	1	93.3	84.9	81.2	91.3	89.9	85.6	93.8	88.5
1918	89.7	91.4	88.4	91.9	84.4	80.4	91.3	88.1	85.6	93.9	88.5

1 No data collected for this year.

average decrease of 11.5 per cent in the length of the average working week in 1918 as contrasted with the average for 1890-1899; (2) a difference in the amount of the decrease from industry to industry varying from 19.6 per cent in the baking trades to 6.1 per cent in newspaper printing.

Turning now to hourly wage rates, the statistics for the ten industries are presented in Table III. This table shows: (1) an average increase of 111.3 per cent from the period 1890-1899 to 1918; (2) a varying increase for the different industries ranging from 192 and 190 per cent for the cotton and woolen goods trades respectively to 46.1 per cent for newspaper printing. The hourly earnings for the three industries for which the actual pay-rolls were used were secured by dividing the total earnings for the week by the number of hours worked. This gives a slightly higher figure than the hourly rate, more especially in the later years, since it partially includes any overtime bonuses that may have been paid. The increase in basic hourly rates themselves therefore tends to be slightly overestimated by their use.

By multiplying the relative number of hours per week by the relative wages per hour, we may obtain the relative full-time weekly earnings. This means the relative amount in money that would be secured if all operatives worked the established number of hours per week at the given hourly rate or wage. Thus in the industries for which union rates are given, if 50 hours constituted the established week's work and if the hourly wage was 30 cents, then \$15 would comprise the full-time weekly earnings. This term therefore does not signify the relative amounts of money that the workers actually receive in their weekly pay check, or as their annual earnings; since it makes no allowance for (1) unemployment, (2) under-employment, or (3) overtime. In other words full-time weekly earnings are based upon the working of the established number of hours for the occupation or industry and do not deal with deviations from that scale whether they be above or below. In the three other trades, the relative hourly earnings were also multiplied by the established number of hours per week. This gives a result which is, of course, not equivalent to actual earnings but is somewhat higher than the method followed for the other industries, since it includes a large part of any overtime bonuses that may have been paid. This is more especially true of the later years.

The movement of relative full-time weekly earnings is shown by Table IV.

This table shows (1) an average increase for 1918 over the period 1890-1899 of 87.7 per cent, (2) a variation in the amount of the increase in different industries ranging from 39.1 per cent in newspaper printing to 162.4 per cent for cotton goods, and 166.4 for woolen goods.

TABLE III.—RELATIVE RATES OF WAGES PER HOUR (BASIS 1890-1899).

Year	Woolen goods	Cotton goods	Boots and shoes	Millwork	Building trades	Bakers	Marble and stone cutters	Foundry and machine shops	Printing, book and job	Printing, newspaper	Average
1890	92.6	101.6	98.5	99.2	97.0	99.3	98.5	99.2	97.8	103.0	99.3
1891	99.3	99.4	97.5	100.4	97.9	99.9	99.5	100.3	99.6	99.6	99.4
1892	100.7	99.2	99.3	100.1	99.9	100.3	100.3	102.7	99.2	98.8	100.1
1893	105.7	105.0	100.6	100.0	100.0	100.2	99.7	101.6	100.2	98.0	101.1
1894	94.9	98.9	99.8	97.0	97.6	98.4	98.0	98.7	99.6	97.4	98.0
1895	95.3	98.2	101.4	98.1	98.4	98.7	97.0	99.1	99.5	96.3	98.2
1896	98.1	104.1	100.5	99.3	99.9	99.6	101.0	106.5	100.3	98.6	100.2
1897	100.4	100.4	100.7	100.0	101.3	99.8	101.6	99.7	99.2	99.2	100.2
1898	103.3	96.7	100.5	101.7	102.8	100.6	101.2	99.0	101.2	102.3	100.9
1899	102.3	95.8	101.8	104.1	105.3	103.1	103.2	99.1	103.6	106.1	102.4
1900	111.3	108.4	104.1	105.9	109.9	106.6	104.9	101.5	109.3	106.3	106.8
1901	111.9	108.8	104.1	108.6	114.5	108.8	109.0	104.7	110.7	106.3	108.7
1902	114.9	113.3	108.0	112.5	121.1	113.9	113.5	108.2	114.3	109.3	112.9
1903	118.7	117.5	113.2	116.5	126.8	118.9	118.6	112.2	116.1	113.4	117.2
1904	115.4	117.1	116.9	115.7	129.7	121.1	118.9	113.9	118.9	114.1	118.2
1905	119.3	118.7	119.9	116.7	132.2	123.5	119.3	114.0	120.6	116.1	120.0
1906	127.1	131.3	121.8	120.6	140.2	127.4	121.3	117.9	125.9	118.4	125.1
1907	135.3	149.8	128.0	124.5	144.6	128.9	125.7	121.4	131.0	132.6	131.2
1908	128.1	148.4	125.5	123.4	146.9	133.9	126.1	122.9	136.0	124.7	131.6
1909	129.0	143.0	130.4	124.9	150.2	140.0	127.1	124.4	139.3	126.0	133.4
1910	132.5	147.7	129.6	127.8	153.1	147.6	129.1	130.0	143.4	129.2	137.0
1911	133.3	149.1	131.7	129.0	157.6	155.6	129.0	133.8	148.2	130.9	139.8
1912	149.1	164.1	132.8	132.3	159.4	167.3	133.9	136.3	150.6	136.3	145.9
1913	147.3	165.9	143.9	133.6	164.2	172.5	138.8	140.7	153.7	135.8	149.6
1914	153.9	172.9	144.6	138.3	166.9	175.9	142.3	141.9	157.2	136.6	153.1
1915	1	1	1	140.9	168.3	177.7	142.9	142.8	158.2	137.0	152.5
1916	192.1	197.8	151.1	152.9	172.4	181.1	146.4	152.9	160.3	137.0	164.5
1917	1	1	1	159.7	181.1	196.7	152.7	168.8	169.5	140.7	167.0
1918	290.0	292.3	193.5	173.0	200.9	234.6	172.1	224.4	186.3	146.1	211.3

1 No data were collected for this year.

2. *The Increase in the Cost of Living*

It is only within the last few years that comprehensive surveys of the increase in the cost of living for different localities covering rent, clothing, fuel, and light, and miscellaneous items as well as food have been made. The only retail prices for which there is a continuous record for the entire period 1890-1918 on any country-wide scale are, however, those for certain food items. As has been pointed out,⁶ the price data compiled by the Bureau of Labor Statistics have many gaps. For the period 1890-1907 an index of thirty commodities, weighted according to their relative importance in the average family budget as revealed by an investigation in 1901 was used. In 1907 fifteen of these commodities were omitted and for the five years 1908-1912 inclusive we have only fifteen commodities. It was these fifteen commodities that were used by Rubinow in constructing his index of food prices. In 1913 seven more commodities were added, making twenty-two in all and these were weighted according to their relative importance. This constitutes the present index of retail food prices compiled by the Bureau of Labor Statistics.

The method followed in continuing the study was to take the fifteen commodities for which there was a permanent record and weight them in the same fashion as practiced by the Bureau of Labor Statistics from 1908 to 1912 and which Rubinow copied.⁷

⁶ In footnote 2.

⁷ This weighting system was derived from the nation-wide budgetary investigation conducted in 1901 by the Bureau of Labor and which assigned the following relative importance to these fifteen commodities (*Eighteenth Annual Report United States Bureau of Labor*, 1903, p. 650).

COMMODITY	RELATIVE IMPORTANCE
Fresh beef.....	1,531
(a) Sirloin steak	
(b) Round steak	
(c) Rib roast	
Pork chops	429
Salt pork products	425
(a) Bacon, smoked	
(b) Ham, smoked	
Hens	290
Eggs, strictly fresh	514
Milk, fresh	652
Butter, creamery	880
Lard, pure	286
Sugar, granulated	482
Flour and meal.....	513
(a) Wheat flour (double weight)	
(b) Corn meal	
Irish potatoes	395
Total	6,397

These items represented 63.97 per cent of the total expenditures for food of 2,567 families in 1901.

TABLE IV.—RELATIVE FULL-TIME WEEKLY EARNINGS (BASIS 1890-1899).

Year	Woolen goods	Cotton goods	Boots and shoes	Millwork	Building trades	Bakers	Marble and stone cutters	Foundry and machine shops	Printing, book and job	Printing, newspaper	Average
1890	100.6	102.1	98.8	100.5	99.4	100.1	99.9	99.7	98.8	103.2	100.3
1891	100.3	100.6	98.1	101.0	99.7	100.7	99.6	100.7	100.6	99.7	100.1
1892	101.7	100.8	101.3	100.8	100.6	101.2	100.5	102.9	100.5	99.7	100.9
1893	105.2	105.0	100.6	100.1	100.5	100.7	100.7	101.6	100.6	99.3	101.4
1894	98.9	96.4	98.9	97.3	98.3	98.8	98.5	98.6	99.7	97.9	97.9
1895	95.4	98.0	101.4	97.8	98.7	98.6	97.1	99.2	99.7	96.7	98.3
1896	98.2	103.6	100.5	98.3	99.1	99.2	100.9	100.3	100.4	98.8	99.9
1897	98.8	99.5	100.5	99.6	99.9	99.9	100.4	99.4	99.4	99.2	99.7
1898	102.2	96.9	100.2	101.1	100.8	99.7	100.4	98.9	100.6	101.9	100.2
1899	102.3	96.1	101.4	103.3	102.7	100.8	101.2	98.5	100.7	103.9	101.1
1900	111.1	108.5	103.4	104.7	104.9	103.3	101.9	100.7	103.9	103.7	104.6
1901	111.8	108.7	103.7	107.2	108.1	104.8	104.6	102.5	104.5	103.5	105.9
1902	114.7	112.7	106.3	109.9	112.1	109.1	108.4	104.5	106.5	106.1	109.0
1903	117.2	116.7	109.8	113.2	116.4	111.6	111.5	107.0	108.1	109.1	112.1
1904	112.9	116.2	113.5	113.3	118.4	113.3	111.8	107.7	109.9	109.2	112.6
1905	117.5	117.8	116.1	114.5	120.7	114.2	112.4	107.9	110.9	111.7	114.4
1906	125.1	129.6	117.3	116.9	127.4	116.9	113.5	111.8	114.2	112.9	118.6
1907	132.5	146.1	122.9	120.4	131.0	118.1	116.4	114.8	118.0	116.2	123.7
1908	135.2	142.9	120.4	119.3	132.8	120.1	117.7	116.1	118.9	117.8	123.1
1909	136.2	137.9	124.8	120.8	135.5	124.0	118.5	116.7	120.9	118.9	124.4
1910	137.3	138.9	123.2	123.8	137.3	128.1	120.1	121.4	123.3	121.4	126.5
1911	138.2	140.3	125.5	124.9	134.4	134.4	119.8	124.2	126.7	122.9	128.9
1912	141.0	151.6	124.7	127.3	142.2	135.8	122.9	126.5	128.8	125.1	132.6
1913	135.8	156.9	133.9	128.5	141.0	140.1	127.7	129.7	131.4	127.4	135.2
1914	132.0	156.8	135.6	130.8	148.3	142.8	129.8	130.2	134.6	128.8	137.9
1915	1	1	1	132.9	144.1	145.7	130.5	131.4	135.3	128.4	135.5
1916	164.0	173.2	139.2	142.7	146.7	147.1	133.7	131.4	137.2	129.1	144.8
1917	1	1	1	148.2	153.8	158.7	139.4	151.8	145.1	131.9	146.9
1918	266.4	262.4	172.9	159.9	175.7	190.4	157.2	197.3	155.6	139.1	187.7

1 No data collected for this year.

Before proceeding further with this material two questions may legitimately be asked: (1) whether these fifteen commodities afford a true picture of food prices in general and (2) whether the changes in food prices themselves are an accurate index of changes in the cost of living as a whole.

In dealing with the first objection, we should realize that these fifteen commodities formed 64 per cent, or nearly two thirds of the average food budget in 1901. Though the relative importance of these items may well have lessened in the years since then, they undoubtedly still comprise a major portion of the food budget of the average workman's family today.

Moreover, while the relative importance of these fifteen commodities as compared with each other has also undoubtedly changed, it is extremely doubtful whether this change in weights would affect the result appreciably. Finally, the relative reliability of the index numbers of these fifteen commodities can be checked up by comparing them with the index numbers derived from a larger number of commodities. Jones, in his critique of Rubinow's investigation, compared the series of fifteen commodities with the old series of thirty commodities for the period 1890-1907 and found that, while there was little difference before 1900, after that date the index for the thirty commodities lagged some 3 to 5 points below the index for the fifteen. This difference, though real, does not seriously impair the general credibility of the index of the fifteen commodities. If we compare the weighted index number for these fifteen commodities for the period 1911-1918 with the weighted index for the twenty-two food commodities now used by the Bureau of Labor Statistics, we have the following results expressed to the nearest point.

Year	(Average 1913 = 100)		Differences between the two indices
	Weighted index 15 commodities	Weighted index 22 commodities	
1911	93	92	1
1912	99	98	1
1913	100	100	0
1914	102	102	0
1915	101	101	0
1916	114	114	0
1917	150	146	4
1918	172	167	5

This shows an almost complete correspondence for the first six years and a difference of 4 and 5 points for the last two. It is safe to conclude, therefore, that the weighted index number of these fifteen food commodities is a fairly close approximation to the real movements of

food prices although it may slightly over-estimate the real increase.

To turn now to the second question, Do the changes in retail food prices correspond with the changes in the cost of living? Cost of living surveys for workingmens' families have been made only within the last few years by the Bureau of Labor Statistics for a number of cities. The actual prices of commodities in the various groups of expenditure including food, clothing, housing, fuel and light, furniture and furnishing, and miscellaneous items were collected and weighted according to their relative importance in the average workingman's budget of that city as disclosed by an investigation of the expenditures of several hundred local families during the period of a year.

The relative cost of living has been carried back to December, 1914, as the base for eighteen cities⁸ and the simple average of these relatives will give a reliable cost of living index for the urban sections of the country.⁹ This can be compared for a similar period with the weighted index of the fifteen food commodities and the relationship indicated. The following table gives this material:

TABLE V.—RELATION BETWEEN RETAIL FOOD PRICES AND THE COST OF LIVING (DECEMBER, 1914 = 100).

Date	Relative cost of living in eighteen cities	Weighted index, fifteen food commodities	Relation between food index and cost of living index
Dec., 1914	100	100	
" 1915	100.4	102.2	+ 1.8
" 1916	114.8	122.0	+ 7.2
" 1917	141.0	153.3	+12.3
" 1918	172.5	182.8	+10.3
" 1919	197.2	195.0	— 2.2

This table indicates therefore that the cost of living will lag behind food prices for short periods, because of the slowness of rents to keep pace, but that in longer periods the two are closely approximate. In all probability, therefore, the use of food prices (which is all we have) will give an accurate picture of the cost of living for the period 1890-1912, but it will somewhat exaggerate the increase during the years 1916, 1917, and 1918.

Since the prices for the food commodities collected by the United States Bureau of Labor Statistics have since 1912 been computed with 1913 as a base, two steps were necessary to connect this price material with Rubinow's index: (1) To secure the weighted index by years of

⁸ I.e., Portland, Me., Boston, New York, Philadelphia, Baltimore, Norfolk, Chicago, Detroit, Cleveland, Buffalo, Los Angeles, Portland, Ore., San Francisco, and Seattle.

⁹ For the increase for each of these cities see *Monthly Labor Review*, Sept., 1919, pp. 107-111; Feb., 1921, pp. 52-57.

the fifteen commodities used by Dr. Rubinow instead of the twenty-two used by the bureau; (2) to transfer these index numbers from a 1913 base to an 1890-1899 base by using 1912 as the connecting link.¹⁰ By this method, we secure the following index of food prices for the years 1890-1918.

YEAR	RELATIVE PRICE	YEAR	RELATIVE PRICE
1890	101.9	1905	116.4
1891	103.4	1906	120.3
1892	101.6	1907	125.9
1893	104.1	1908	130.1
1894	99.2	1909	137.2
1895	97.1	1910	144.1
1896	95.2	1911	143.0
1897	96.7	1912	154.2
1898	99.7	1913	155.7
1899	100.8	1914	158.5
1900	103.0	1915	156.5
1901	108.5	1916	177.6
1902	114.6	1917	233.4
1903	114.7	1918	266.6
1904	116.2		

3. Real Wages

We can now bring our material together into a final table summarizing the trend of hours per week, wages per week, full-time weekly earnings, and retail food prices. From the last three of these items the relative purchasing power of an hour's work and a full-time week's work can be computed. Table VI contains all this material. An analysis of this table shows that:

1. The purchasing power of an hour's wages was 20.7 per cent less in 1918 than it had been during the years 1890-1899, and that the purchasing power of full-time weekly earnings was 29.6 per cent less than during this period.

2. This great decrease was concentrated almost wholly in two periods: (a) the years 1907-1912, (b) the years 1916-1917.

3. During the period 1907-1912 wages per hour increased from 131.2 to 145.9 or 11.0 per cent, yet from 1913 to 1918 they increased from 149.6 to 211.3 or 41 per cent.

4. During the years 1907-1912 full-time weekly earnings rose from 123.7 to 132.6 or 7 per cent, while in the period 1913-1918 they increased from 135.2 to 187.7 or 38 per cent.

5. During the period 1907-1912 retail food prices rose from 125.9 to 154.2 or 22 per cent, while during the years 1913-1918 they increased from 155.7 to 266.6 or 71 per cent.

6. In the years 1907-1912 the purchasing power of hourly wages as

¹⁰ There is, of course, the possibility of a slight error in thus splicing the index numbers, but for all practical purposes it can be neglected.

TABLE VI.—INDEX OF REAL WAGES 1890-1918.

Year	Hours per week	Wages per hour	Full time weekly wages	Retail food prices	Purchasing power measured by retail prices of food, of:	
					Wages per hour	Full-time weekly earnings
1890	100.9	99.4	100.3	101.9	97.5	98.4
1891	100.8	99.3	100.1	103.4	96.0	96.8
1892	100.8	100.1	100.9	101.6	98.5	99.3
1893	100.3	101.1	101.4	104.1	97.1	97.5
1894	99.9	98.0	97.9	99.2	98.8	98.7
1895	100.1	98.2	98.3	97.1	101.1	101.2
1896	99.7	100.2	99.9	95.2	105.3	104.6
1897	99.5	100.2	99.7	96.7	103.6	103.2
1898	99.3	100.9	100.2	99.7	101.2	100.5
1899	98.7	102.4	101.1	100.8	101.6	100.3
1900	97.9	106.8	104.6	103.0	103.7	101.6
1901	97.5	108.7	105.9	108.5	100.1	97.6
1902	96.6	112.9	109.0	114.6	98.5	95.1
1903	95.7	117.2	112.1	114.7	102.2	97.6
1904	95.4	118.2	112.6	116.2	101.7	96.9
1905	95.4	120.0	114.4	116.4	103.1	98.3
1906	94.8	125.1	118.6	120.3	103.9	98.6
1907	94.3	131.2	123.7	125.9	104.2	98.2
1908	93.6	131.6	123.1	130.1	101.2	94.6
1909	93.4	133.4	124.4	137.2	97.2	90.7
1910	92.5	137.0	126.5	144.1	95.1	87.8
1911	92.2	139.8	128.9	143.0	97.8	90.1
1912	91.1	145.9	132.6	154.2	94.6	85.9
1913	90.6	149.6	135.2	155.7	96.1	86.8
1914	90.1	153.1	137.9	158.5	96.5	87.0
1915	89.2	152.5	135.5	156.5	97.5	86.6
1916	89.7	164.5	144.8	177.6	92.6	80.8
1917	88.5	167.0	146.9	233.4	71.6	64.0
1918	88.5	211.3	187.7	266.6	79.3	70.4

measured by retail food prices decreased from 104.2 to 94.6 or 9 per cent, while from 1913 to 1918 the decrease was from 96.1 to 79.3 or a drop of 17 per cent.

7. In the years 1907-1912 the purchasing power of full-time weekly earnings decreased from 98.2 to 85.9 or 13 per cent, while from 1913 to 1918 they fell from 86.8 to 70.4 or a decrease of 19 per cent.

8. From 1912 to 1916 money wages not only held their own but indeed gained slightly upon prices, but the sudden upward movement of prices in 1916 was accompanied by only a slight increase in wage rates and the result was that in two years the purchasing power of hourly wages declined 27.1 per cent and the purchasing power of full-time weekly earnings 26 per cent.

9. Money wages began to gain upon prices in 1918 and in consequence real wages rose in that year over their low-water mark of 1917.

Certain cautions, however, should be observed in using this material:

(1) The industries covered do not include such wartime industries

as munitions plants. Some of the occupations within these industries enjoyed increases in wages more than sufficient to compensate for the increase in the cost of living. Household servants are naturally not included and they too profited. On the other hand, neither are the railroad workers and the coal miners included, and their wages notoriously lagged behind the increase in prices.¹¹ Farm laborers also lost during the war period, as Professor Viner has shown.¹² Moreover, the wage statistics after 1907 refer chiefly to union workmen. They consequently do not include most of the unskilled workers and, save for the year 1918, it is extremely probable that the increases for this class were not as great as for the union workers who were at once more skilled and possessed stronger bargaining powers.

(2) The wage scales used since 1907 for seven of the industries were the union scales. Until 1917, and perhaps even until 1918, the union scale did actually represent in practice "the prevailing wage of a locality for efficient labor."¹³ In 1918, however, due to the relative scarcity of labor, a much larger percentage than usual of the workers were paid in excess of this scale. To the extent that this occurred, the use of the union scale fails to give a completely accurate representation of actual wage rates. This criticism, of course, does not apply to the three industries for which pay-roll data were used.

(3) As has been pointed out, the use of retail food prices exaggerates the increase in the cost of living for the years 1916, 1917, and 1918.¹⁴ The actual decline in real wages for these years was accordingly somewhat less than is shown above.

(4) As has been explained, the relative full-time weekly earnings do not represent the relative amounts of *money actually received* per week. If the relative amount of unemployment or under-employment should decrease, then the relative actual amounts received would (to that extent at least) increase. Likewise if the relative amount of overtime increased, the relative actual earnings would rise. The industrial pressure brought by the war did, beyond doubt, decrease unemployment and increase overtime.

Two questions may then be asked: (a) Was the increase in em-

¹¹ See *Report of the Railroad Wage Commission to the Director General of the Railroads* (1918), published by the United States Railway Administration; also *Award and Recommendations of the United States Bituminous Coal Commission* (1920), pp. 36-45.

¹² Jacob Viner, "Who Paid for the War," *Journal of Political Economy* (Jan., 1920), pp. 70-71.

¹³ *Union Scale of Wages and Hours of Labor*, United States Bureau of Labor Statistics Bulletin No. 214, p. 11.

¹⁴ For the years 1919 and 1920 on the other hand the retail food index was considerably less than the cost of living.

ployment per week more than sufficient to offset the loss in hourly wage rates? What was the course of *actual money earnings per week* as compared with the cost of living? (b) Which is the more significant, actual earnings or wage rates? These will now be considered in turn:

(a) Practically the only authoritative material on actual weekly wage payments, including both overtime and undertime, is that collected by the industrial commissions of New York and Wisconsin and published in their respective Labor Market bulletins. The former covers some 600,000 workmen, while the latter is based upon approximately 80,000 workmen. In both cases a very narrow base is used for computation, the single month of June, 1914, serving in New York and the first quarter of 1915 in Wisconsin. The following table shows the purchasing power of average weekly wage payments in the manufacturing industries of each of these two states in terms of their respective bases.

TABLE VII.—COMPARISON OF AVERAGE WEEKLY EARNINGS OF FACTORIES IN NEW YORK STATE AND WISCONSIN WITH COURSE OF RETAIL FOOD PRICES
IN THE UNITED STATES.¹

(For New York, June 1914 = 100. For Wisconsin, first quarter, 1915 = 100.)

Date	Average weekly earnings		Retail food prices U. S. 22 commodities		Purchasing power of average weekly earnings in terms of food	
	New York	Wisconsin	New York	Wisconsin	New York	Wisconsin
1914	98		105		93.3	
1915	101		102		99.0	
Aug. "		108		99		109.1
1916	114		115		99.1	
Feb. "		117		105		111.4
Aug. "		124		112		110.7
1917	129		147		87.7	
Feb. "		134		132		101.5
Aug. "		146		148		98.6
1918	160		170		94.1	
Feb. "		157		160		98.1
Aug. "		193		170		113.5
1919	185		188		98.4	
Feb. "		209		171		122.2
Aug. "		205		191		107.3
Feb. 1920	224	240		198		121.2
July "		250	221	217	101.4	115.2

¹ *New York Labor Market Bulletin*, Oct., 1920, p. 5; *The Wisconsin Labor Market*, Bulletin No. 1 and data furnished by Mr. A. J. Altmeyer, statistician for the commission. Prior to July, 1920, the Wisconsin statistics are given by quarters and not by months. The middle month of the quarter has accordingly been taken as typical of the quarter as a whole.

This table shows that so far as New York state workers were concerned the greater amount of employment was not sufficient to compensate for the decreased purchasing power of an hour's work. The average week's pay envelope actually purchased 12 and 6 per cent less respectively in 1917 and 1918 than in June, 1914, despite the fact that

the workmen were employed more steadily and worked longer hours. In Wisconsin, however, there was apparently a fluctuating increase in real weekly wages over the base after February, 1918, although for a few months preceding this, the index was slightly lower than in the period chosen as the base.

As a matter of fact both the New York and Wisconsin figures give a more optimistic picture than is justified. It has already been pointed out that both use an exceedingly narrow base—that of New York being only one month, while that of Wisconsin is only three months. What is more, each of the base periods occurred during the depression of 1914-1915 when there was a large amount of unemployment and short time. Thus in June, 1914, 25.5 per cent of the union members in New York state for whom reports were made were unemployed.¹⁵ This percentage was in excess of the percentages of unemployment for fifty out of the sixty-six months from January, 1909, to June, 1914, inclusive. Periods of unusual unemployment are accompanied by a great deal of short time, and weekly pay checks are in consequence abnormally low. The use of June, 1914, as the base, therefore, fixes an unduly low starting point and consequently exaggerates the later increase in actual weekly earnings.¹⁶ The same criticism applies with even greater force to the base used by the Wisconsin commission. The early winter months of 1915 were marked by closed factories, widespread unemployment and extensive short-time. There are no statistics covering the actual amount of unemployment in Wisconsin at this time, but in New York 32.6 per cent of the trade-union members were idle during the first quarter of 1915;¹⁷ while in Massachusetts in March 16.6 per cent, or practically twice as many as the average for the years 1911, 1912, and 1913, were unemployed.¹⁸ This in large part accounts for the fact that the Wisconsin index rises more rapidly than that of New York during 1915 and for its higher position throughout the war period. Had a longer or a more representative period been used as the base for both of these studies, the later figures concerning actual weekly wages expressed in relatives would have been considerably lower. In other words, the workers in New York state lost even more than is indicated above, while the workers in Wisconsin gained less than is shown and, at least until late in 1918, quite probably did not gain at all.

¹⁵ *Bulletin No. 85*, New York State Department of Labor, *Course of Employment in New York State*, p. 50.

¹⁶ For the same reason, the use of the year 1896 as the base would exaggerate the increase in retail food costs and in wholesale prices. The ten-year period 1890-1899 is used to obviate this difficulty.

¹⁷ *Bulletin 85*. New York State Department of Labor, *op cit.*, p. 50.

¹⁸ *Massachusetts Industrial Review*, vol. I, no. 2 (July, 1920), p. 25.

(b) Whether, as a matter of fact, total weekly earnings would give a fairer picture of the worker's status than do hourly wage rates, it is impossible, with our scanty material, to tell. The answer would require a knowledge of pre-war and post-war *hours worked*; and that knowledge is not available. It may be worth while, however, to point out how such material could be used if we did have it.

Very roughly, the question of the relative significance of hourly rates and weekly earnings depends necessarily upon a somewhat complex double factor of judgment; the interrelation not merely of previous and present hours worked to previous and present wage rates but the relation of all four to some sort of mental standard in the way of a "normal" working week. This last criterion is indispensable. Suppose a man had previously been employed only 20 hours a week and was now enabled to work 40 hours. Even though his total earnings rose thereby only 50 per cent, would not most critics be assured that his new surplus constituted a real human gain and would they not hence be forced in this case to consider weekly earnings the significant standard? Suppose, however, that he had already been employed 40 hours and was now raised to 80 hours. Would this inhumanly long labor be compensated for adequately by a 50 per cent addition in earnings? Assuredly no. Hence the hourly wage would here give the fairer picture. Or again, in the third place, suppose the original hours worked were 40 and were now raised to 48 or 50 (an amount typically involving no undue strain) but the gain in total earnings was only 2 or 3 per cent. Would that small cash gain be worth the extra effort? Here the issue is not so clear, although most of us would probably hold that the gain was not worth the trouble and that once more the hourly rate was the more significant. If, on the other hand, the increase from 40 hours of labor to 50 had entailed an income gain of 12 to 15 per cent, many would think the result worth while—and hence again resort to the weekly earnings as base.

It is believed that the qualifications pointed out above with respect to other industries, trade-union rates, and retail food prices, would not greatly alter the situation as revealed by Table VI. While any estimate may be in the nature of a guess, it is the belief of the writers that these factors would not introduce a change in real wages in excess of 10 points and probably less.

All the evidence seems to indicate that at the termination of the great war¹⁹ the return in commodities which the American workman re-

¹⁹ It is probable that labor gained ground upon the cost of living in 1919 and the early part of 1920. Whether this was sufficient to bring them back to the pre-war basis is not certain. It is clear that it was not so far as Boston, Mass. was concerned. The increase in hourly wage rates in organized occupations from July,

ceived for an equal length of time worked (one hour) was from 10 to 20 per cent less than it was in the decade 1890-1899, and from 7 to 17 per cent less than it was before the sharp upward movement of prices in 1916.²⁰ The purchasing power of the established week's work, moreover, was from 20 to 30 per cent less than in the nineties and from 10 to 20 per cent less than in 1915. American labor as a whole, therefore, cannot legitimately be charged with having profiteered during the war. Rather, like Alice in Wonderland, it was compelled to run faster in order to stay in the same place.

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1914, to July 1, 1920, was 83.5 per cent and for "full-time" weekly earnings 72.7 per cent while the cost of living increased in Boston from December, 1914 to June, 1920, 110.7 per cent! See *Massachusetts Industrial Review*, vol. I, no. 2 (July, 1920), pp. 13-20 and mimeographed bulletin 964, U. S. Bureau of Labor Statistics.

²⁰ For a summary and critique of the wage studies of the National Industrial Conference see the review by Paul H. Douglas in *Quarterly Publications of the American Statistical Association*, September, 1921.